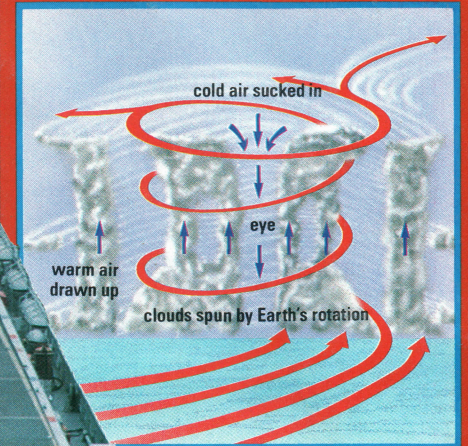


QUEST

ADVENTURES IN THE WORLD OF SCIENCE

Q War at sea – ships, submarines, missiles



Q How were the oceans formed?

Q Killer shark – the real 'Jaws'

Q The world of air-sea rescue

Q Untamed power – the violence of the seas

Q Underwater explorers

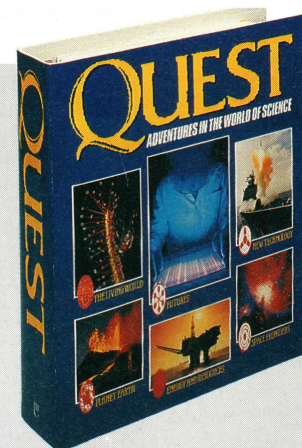
Q Harvesting the oceans

Q Patrol of the deep – bizarre sea creatures

THE OCEANS 1

QUEST

CONTENTS 1



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PLANET EARTH

IN THE BEGINNING

1-2

Birth of the oceans — the continental shelf — volcanic islands — coral reefs — underwater mountains

THE VIOLENT SEAS

3-4

Wind fury and wave power — anatomy of a hurricane — killer waves — the Bermuda Triangle — waterspouts

THE LIVING WORLD

SHARK ATTACK

1-2

The great white — selecting its victim — worst mass attack — shark spotter — the man who survived

WONDERS OF THE DEEP

3-4

The female with the luminous head — the male who bears the babies — the fish filled with blue gas — and more



NEW TECHNOLOGY

WEAPONS AT SEA

1-4

Sea-skimming missiles — tracking Exocet — Seawolf — *Nimitz* and *Invincible* — Polaris and Trident

RESCUE AND SURVIVAL

5-6

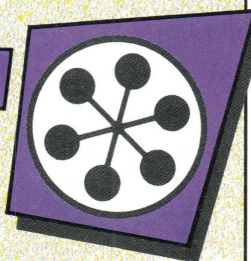
The fastest lifeboats — Wessex and Sea King helicopters — Zeebrugge — tips for ocean survival

FUTURES

PROBING THE DEPTHS

1-4

The scuba diver — how the aqualung works — the 'narks' and the 'bends' — saturation and atmospheric diving — submersibles — robots — exploring the *Titanic* — the diver's 'astronaut' suit — underwater cities

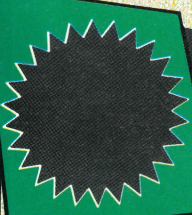


ENERGY AND RESOURCES

WEALTH OF THE OCEANS

1-4

Minerals under the sea — plundering the ocean's resources — farming for fish — deep sea drugs — pollution, the world's great dilemma — tuna and whale scandals — the sea's most valuable resource



Cover The British light aircraft carrier, HMS *Invincible*.
Richard Cooke

QUEST

ADVENTURES IN THE WORLD OF SCIENCE

- ☐ Earth and the Milky Way
- ☐ How a star is born



- ☐ Survival in space
- ☐ Spy in the sky
- ☐ Shuttle service to the stars
- ☐ The outermost planets
- ☐ Star Wars — will it happen?
- ☐ Telescopes for the future
- ☐ Manned missions to Mars
- ☐ Moon-walk

MAN IN SPACE 2

QUEST

CONTENTS 2



PLANET EARTH

A PLACE IN THE UNIVERSE

5-6

Earth in the Solar System – the Milky Way – how the Earth was created – galaxies and the Universe – meteorite bombardments – death of the dinosaurs

THE LIVING WORLD

SURVIVING IN SPACE

5-6

Training astronauts – weightlessness – zero-gravity and its effect on the human skeleton – working in space



NEW TECHNOLOGY

FLYING THE SHUTTLE

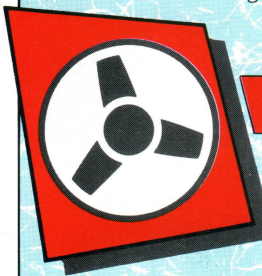
7-8

The re-usable spacecraft – using manned manoeuvring units in space – Shuttle missions

STAR WARS

9-10

X-ray lasers – interceptor rockets – rail guns and particle guns – heat seeking sensors – killer satellites



SPACE FRONTIERS

MOON SHOT

1-2

Man's first steps on the Moon – the Apollo spacecraft – exploring the Moon's surface – splashdown to Earth

THE OUTER PLANETS

3-4

Jupiter – Saturn – Uranus – Neptune – Pluto – multi-coloured atmospheres and gassy blankets – colliding worlds

MARS – MAN'S NEXT BASE

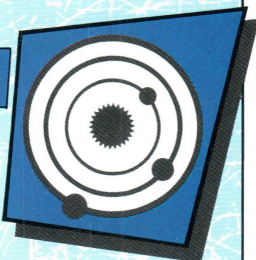
5-8

Space flights to the Red Planet – robot probes on Martian soil – the Mars Observer craft – future colonization

LIFE OF A STAR

9-10

The stellar giants – black holes and supernovas – death of the Sun



FUTURES

SPY IN THE SKY

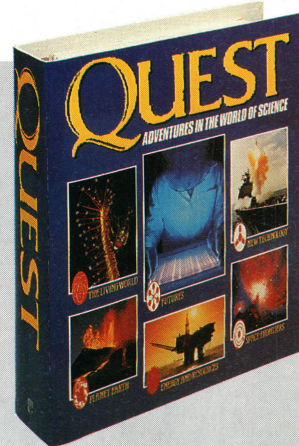
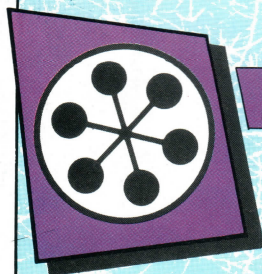
5-6

Mapping the Earth's resources – weather predictions – artificial 'stars'

TELESCOPES FOR TOMORROW

7-8

The all-seeing tools of astronomy – decoding cosmic messages – radio telescopes



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ADVENTURES IN THE WORLD OF SCIENCE

Disc versus tape – the audio visual revolution



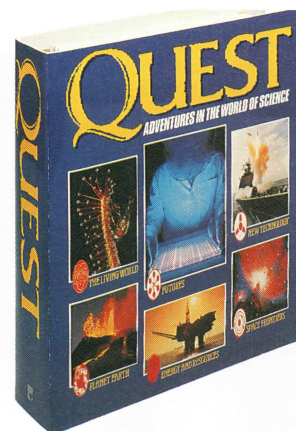
- ☐ The world of TV and radio
- ☐ Telephones for the future
- ☐ Modern mail – and facts about fax
- ☐ How animals converse
- ☐ Satellites – relaying messages through space
- ☐ Inside print technology
- ☐ Waiting for alien messages



COMMUNICATIONS 3

QUEST

CONTENTS 3



THE LIVING WORLD

ANIMAL CHAT

7-8

Secret signs and signals – dancing honeybees – teaching chimps to communicate – talking dolphins – the song of the humpback whale – soldier ants and pheromones

NEW TECHNOLOGY

INSIDE RADIO AND TELEVISION

11-14

Radio broadcasting – AM and FM – varying wavelengths – combining sound and vision – cable and satellite TV – giant-sized and miniature screens

THE PRINT BUSINESS

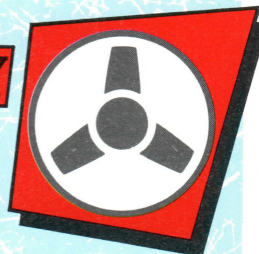
15-16

Reproducing colour – screening dots – how the printed word reaches the page – hot metal versus computer typesetting – printing by laser – desk-top publishing

AUDIO VISUAL

17-20

How records and tapes are made – video and the future of VHS – CD players – music by laser – the rise of digital audio tape – perfect sound



SPACE FRONTIERS

MESSAGES FROM THE SKY

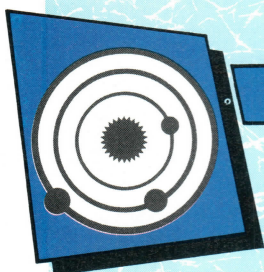
11-12

Navigation from space – using transmission satellites – how messages are received – what are Molniya and Intelsat? – in-car satellite links

IN SEARCH OF E.T.

13-14

Waiting for alien messages – choosing the right frequency – the Arecibo pictogram – Pioneer and Voyager space probes – interpreting the language



FUTURES

ELECTRONIC MAIL

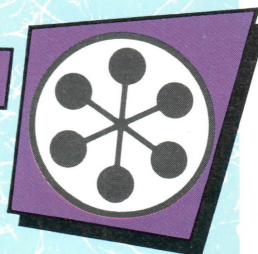
9-10

The automatic post office – sorting by dots – computer links – fax machines and telex – exchanging information – shopping by phone

THE TELEPHONE REVOLUTION

11-14

Cordless phones and translation systems – analogue and digital signals – radiophones and answering machines – optical fibre – videophones



Cover 'Communications: The State of the Art' Steven Hunt/Image Bank
Michael Jackson Rex Features

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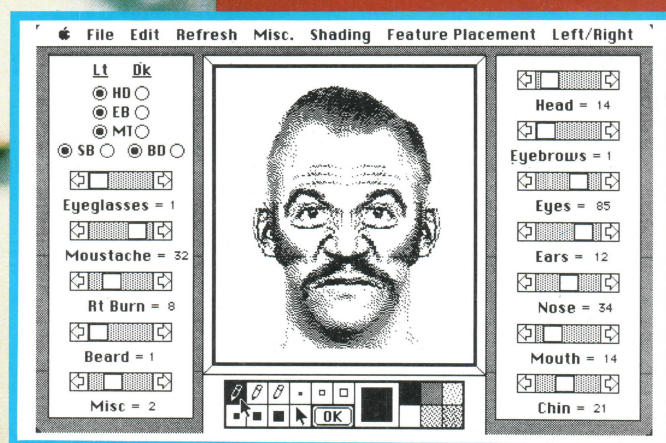
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☒ New ways to identify the criminal

☒ Guns – and the science of ballistics

☒ Fraud and forgery

☒ Drugs deterrents

☒ Hijack and terrorism

☒ Murder – the victims and assailants

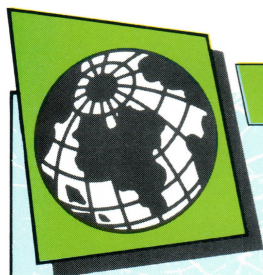
☒ Computer-age law enforcement

CRIME BUSTERS

4

QUEST

CONTENTS 4



PLANET EARTH

THE DRUGS MENACE

7-8

Major drugs producing areas – the big three (heroin, cocaine and marijuana) – how drugs are smuggled – catching the dealers

THE LIVING WORLD

MURDER ONE

9-12

Establishing the cause of death – role of the pathologist – estimating time of death – deadly poisons – post mortems – rogues gallery

HIJACK!

13-14

Profile of a hijack – saving the hostages – the Stockholm Syndrome – the Iranian Embassy siege – bargaining ploys – role of the SAS



NEW TECHNOLOGY

FRAUD AND FORGERY

21-22

Catching the counterfeiter – computer crime – forging the 'great masters' – carbon dating and the Turin shroud

COMPUTER-AGE POLICING

23-24

Using technology to stop crime – HOLMES and the Police National Computer – traffic monitoring – international policing

GUNS AND BALLISTICS

25-26

Inside a gun barrel – profile of a pistol – identifying the killer bullet – gun calibres – assorted criminals' weapons

FUTURES

DANGER PATROL

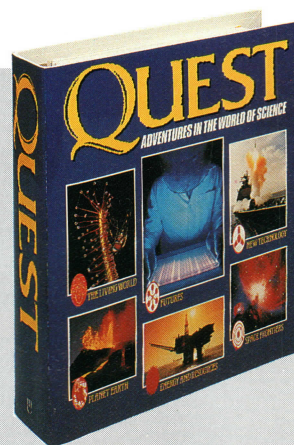
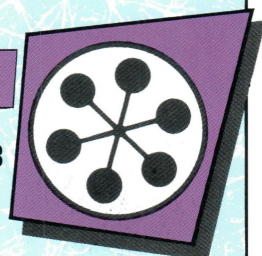
15-18

Policing a riot – protective materials – tear gas – plastic bullets – controlling football crowds – defusing terrorist bombs

IDENTIFYING THE CRIMINAL

19-22

Photofits and videofits – fingerprints – dentistry and blood types – lie detectors – DNA – first genetic conviction



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- ☐ Sewage systems – how they work
- ☐ Inner city pests
- ☐ Energy for all –

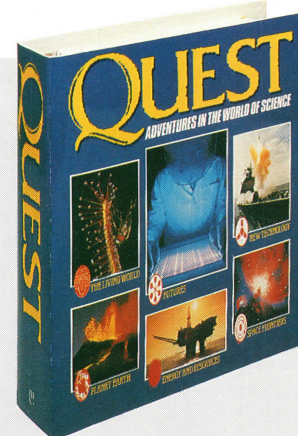
☐ Solving the population crisis



CITIES AND COMMUNITIES

QUEST

CONTENTS 5



PLANET EARTH

POPULATION OVERLOAD

9-10

Overcrowded capitals – the meteoric rise of Mexico City – the Chinese solution – feeding the Third World – shanty towns

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URBAN PARASITES

15-16

The common house fly – the bluebottle – cockroaches – killer rats – house mice – scavenger birds – disease carriers

ANIMAL KINGDOMS

17-20

Ant society – elephant herds – monkeys and apes – the amazing meerkats – packs of wolves – birds and fishes – family units



NEW TECHNOLOGY

GETTING ABOUT TOWN

27-30

Modern buses and trams – unmanned tube trains – the London Docklands railway – cable cars – the floating train – taxis for the future

THE WASTE CYCLE

31-32

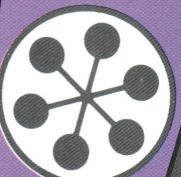
Underground sewage – making waste safe – average water consumption – anatomy of a sewage plant – creative use of effluents

FUTURES

BUILDINGS FOR THE FUTURE

23-26

Polluted cities – planning a new town – unusual houses – underground homes – geodesic domes – the solar house – 'grow your own home'

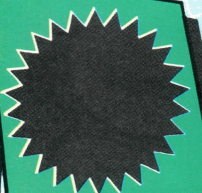


ENERGY AND RESOURCES

POWER TO THE PEOPLE

5-8

Gas rigs – 'the intelligent pig' – how electricity is generated – nuclear power – the Chernobyl disaster – alternative energy sources



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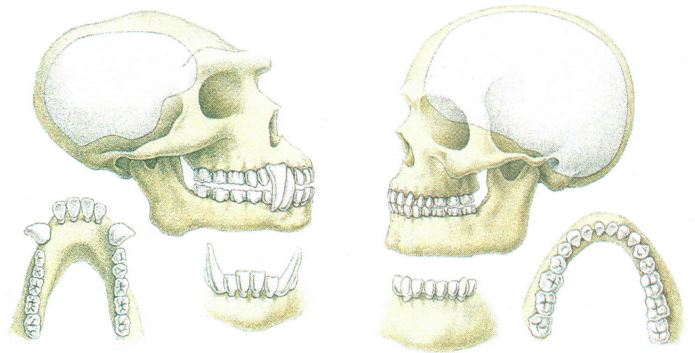
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- ❑ Cells – building blocks of life
- ❑ Man learns to walk and talk
- ❑ Test-tube babies and cloned animals
- ❑ Everyday life in a space station
- ❑ Beyond the human being

LIFE FORCES 6

QUEST

CONTENTS 6



PLANET EARTH

FOUR BILLION YEARS BC

11-12

Organic molecules in the Earth's gases – chemical reactions triggered by Nature – single-cell life – cell divisions and mutations

SMALL BEGINNINGS

13-14

The first fossils – jawless fish – life on land begins – resilient cockroaches – death of the dinosaurs – Man appears

THE LIVING WORLD

THE EVOLUTION OF MAN

21-24

The oldest footprints – Man stands up – making tools and hunting for food – early settlers – population explosion



NEW TECHNOLOGY

CLONE ZONES

33-36

Genetic engineering – cloning plants – playing God – frozen for the future – replacement surgery – Frankenstein monsters

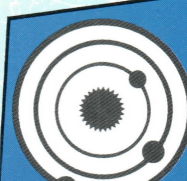


SPACE FRONTIERS

A HOME IN SPACE?

15-16

Without gravitation – artificial day and night – space foods – recycling waste – radiation hazards – space colonies

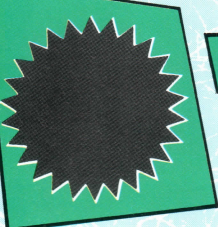


ENERGY AND RESOURCES

THREAT TO LIFE

9-12

Endangered species – the end of the rain forests – burgers instead of trees – creating deserts – the greenhouse effect – acid rain



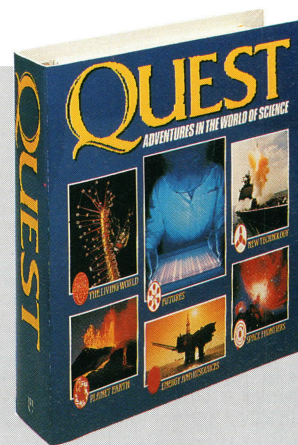
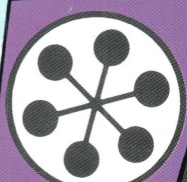
FUTURES

THE MAN MACHINE

27-30

Cars made by robots – machine scientists – sperm and cell banks – living in a box – bionic man – bio-chips

Cover Robot car welders



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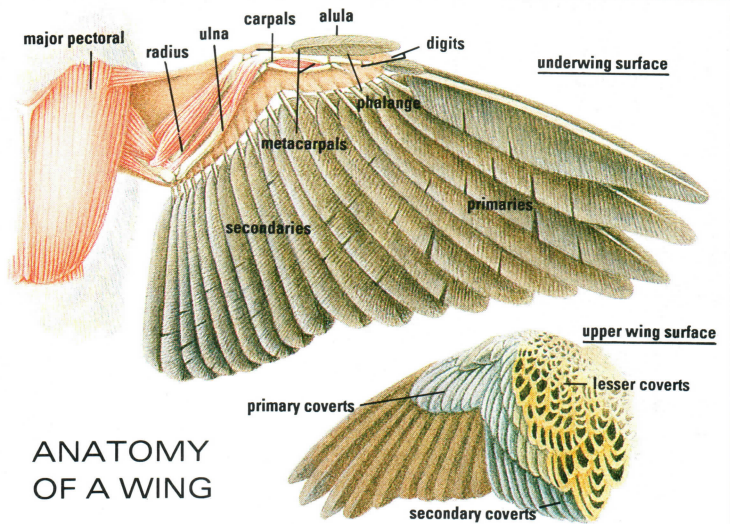
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- ☐ Into the future - invisible aircraft
- ☐ Sky wars
- ☐ The vertical flyers
- ☐ Floating and gliding
- ☐ Why planes fly



- ☐ Nature's flying machines

FLIGHT 7

QUEST

CONTENTS 7

THE LIVING WORLD

NATURE'S FLYING MACHINES

25-28

How birds fly – wing shapes – flying insects – globetrotting butterfly – bird navigation – seeing with the ears – bats and homing pigeons



NEW TECHNOLOGY

SKY WARS

37-38

Fighters into bombers – cranked-arrow wings – dual-role fighters – short take-off and landing – missile systems – Exocets – falling from the sky

FLIGHT 2000

39-42

Flight-data helmets – voice control – thought control – ejector seats – invisible planes – lighter materials – Stealth aircraft



FUTURES

FLYING COMPUTERS

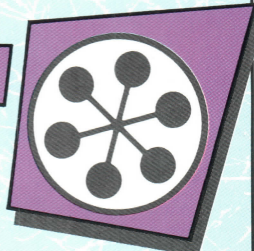
31-32

Fly-by-wire – alpha-floor protection – optical control systems – the black box – fault display systems

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33-34

Out of the wind tunnel – engineering simulators – heat-sensitive paints – weather watch



ENERGY AND RESOURCES

WHAT GOES UP

13-14

The principles of flight – air speed – how to reduce drag – 'pitch, roll and yaw' – jets versus propellers – the world's busiest airport

LIGHTER THAN AIR

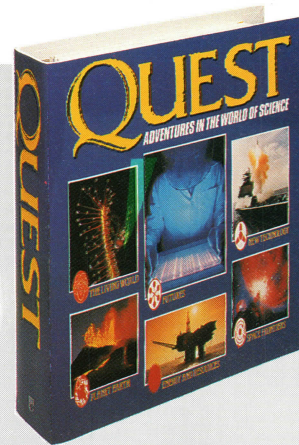
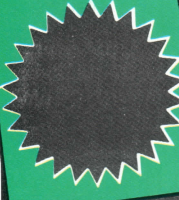
15-18

Hot-air balloons – Hindenburg disaster – steering airships – gliders and hang gliders – balloons in use

ROTOR FORCE

19-20

Vertical take-off – giant choppers – aerial hovercraft – controlling a helicopter – tilt-rotors – military uses



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ADVENTURES IN THE WORLD OF SCIENCE

Animal attack and self-defence



Satellite killers

Uranium, plutonium and chain-reactions

The Nuclear Bomb

What happens if the bomb falls...

Chemical warfare

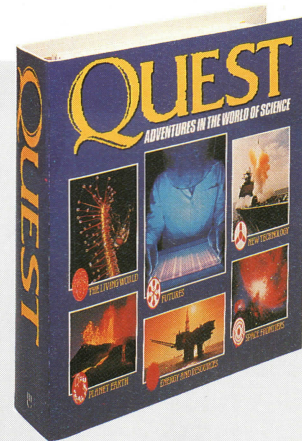
Crossbow hunters

Anti-tank weapons

WEAPONS 8

QUEST

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THE LIVING WORLD

THE PREDATORS

29-32

Killing to survive – the big cats – danger in the water – stings and shocks – deadly reptiles – death by suffocation – fangs and poison

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43-44

High-tech archery – the revolutionary compound – modern arrows – today's technology and the crossbow – the crossbow pistol

COUNTER ATTACK

45-48

Anti-tank missiles – tank armaments – armour-piercing shells – air attacks – methods of subterfuge – stealth technology – complex ECM systems

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49-52

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17-18

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35-36

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IF THE BOMB FALLS ...

37-38

The fatal effects of fallout – a changing world climate – the dangers of starvation – the end of civilization

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CHAIN REACTION

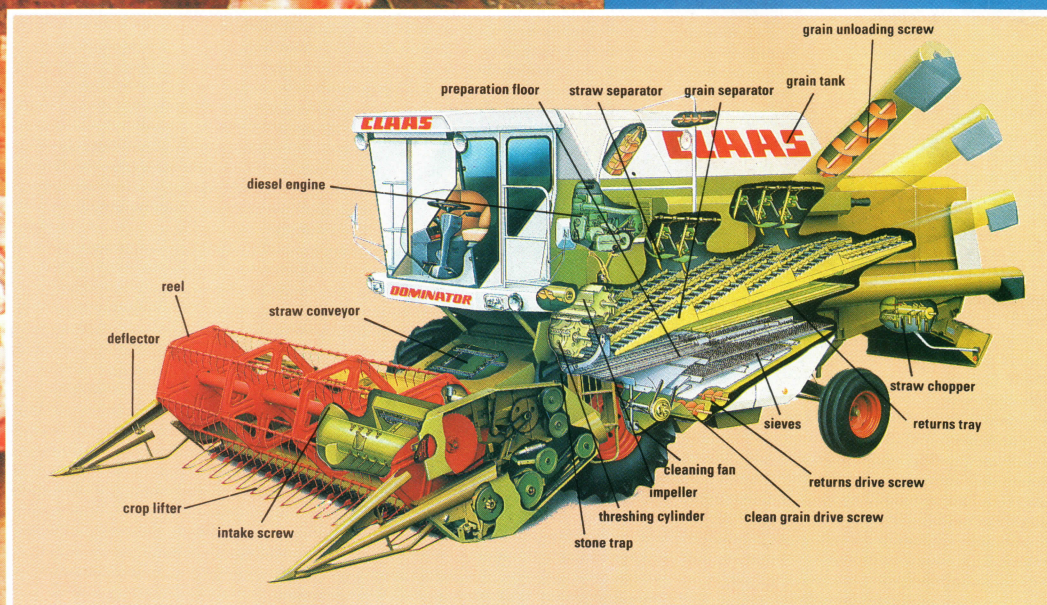
21-22

Neutrons, protons and electrons – uranium 235 – splitting the atom – uranium enrichment plants – plutonium production – the ultimate test

QUEST

ADVENTURES IN THE WORLD OF SCIENCE

- ❑ Vital nutrients
- ❑ Food irradiation
- ❑ Animal's strange eating habits
- ❑ Battery farming
- ❑ Disease-resistant crops
- ❑ Additives and antibiotics
- ❑ Bar codes de-coded
- ❑ Food preservation
- ❑ Automation and the computerized cow



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PLANET EARTH

TRAINED TO SURVIVE

15-18

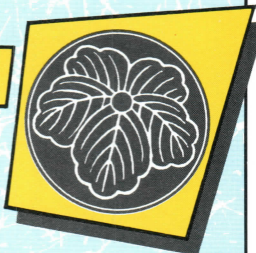
Soldier's survival pack – effects of dehydration – catching game in the wild – earth ovens – survival at sea

THE LIVING WORLD

WEIRD DIETS

33-34

Animals' strange eating habits – immunity to poison – vegetarian vultures – insects that eat their mate – regurgitating food – worm casts



NEW TECHNOLOGY

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53-56

Battery hens – meat production – boosting growth – automated milking – fish farms – biological controls

PROCESSES FOR PRESERVATION

57-58

Yeasts and moulds – bacteria – food spoilage – heat treatments – drying techniques – blast and plate freezing – food irradiation – megarads

FUTURES

SCI-FI FOODS

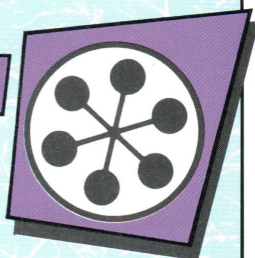
39-40

Concentrated protein from clover – turning vegetables into milk in the lab – techniques for disease-resistant crops – hi-tech greenhouses

SUPERMARKET 2000

41-42

Bar codes – micro-computers and flat-bed scanners – changing price lines – up-dating stock records – cheque machines – shopping with cards



ENERGY AND RESOURCES

FUEL FOR LIFE

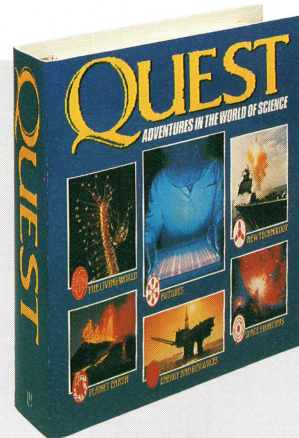
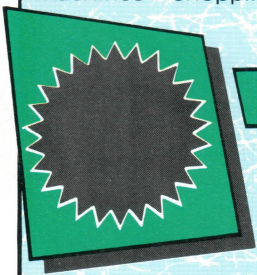
23-26

The importance of protein – different fats – sugary and starchy carbohydrates – vital vitamins

TIPPING THE BALANCE

27-28

Two sides of the coin – food mountains and famine – food adulteration – a mouthful of additives – bloating poultry with water – antibiotics in meat



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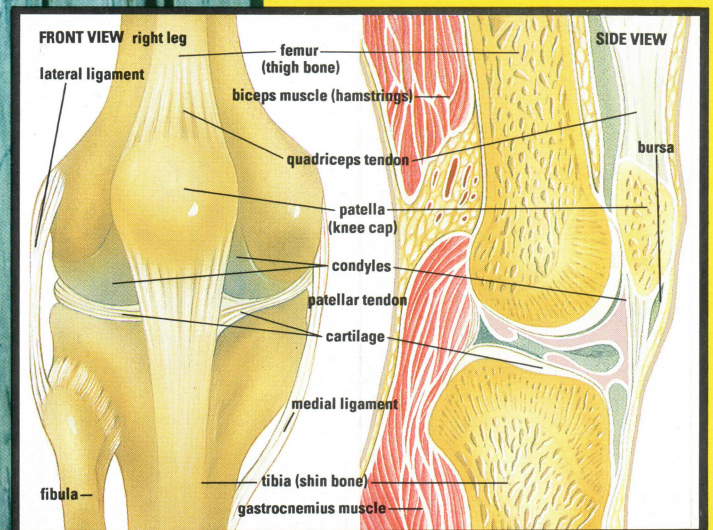
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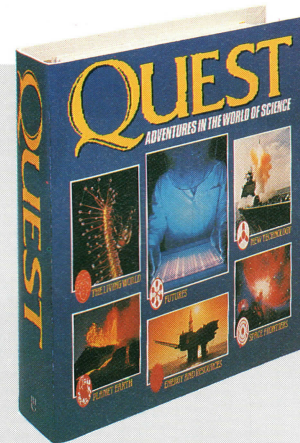
- ☐ High altitude hazards
- ☐ Breeding champion animals
- ☐ Revving up racing cars
- ☐ Analyzing performance
- ☐ Muscle power
- ☐ Anatomy of a ski
- ☐ Surfing skills
- ☐ Eating to win



- ☐ Injuries – causes and cures

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PLANET EARTH

MAN AGAINST NATURE

19-22

Conquering mountains – oxygen at high altitudes – physical adaptation – slalom and downhill skiing – how a ski is made – danger of avalanche – potholing – latest equipment

CONQUERING THE WAVES

23-26

Wave power – body surfing – styles of board – aerodynamics of windsurfing – water skiing – dynamic balance – shooting the rapids – rowing – lever and fulcrum

THE LIVING WORLD

BREEDING THOROUGHBREDS

35-36

Breeding for success – new bloodlines – in-breeding – pedigrees – stud farms – champion greyhounds – hot-shot pigeons – planned pairings

SPORTING HAZARDS

37-38

Overtraining and injury – muscle tears and strains – anatomy of a knee – stress fractures – avoiding damage – warming up – laser therapy

NEW TECHNOLOGY

HIGH PERFORMANCE EQUIPMENT

59-60

Multi-gym – weight chains and cams – Hydraulic machines – computer analysis – artificial playing surfaces – photo finish cameras – footwear

POWER RACING

61-64

Maximizing engine power – electronic turbochargers – super-lightweight chassis – braking systems – carbon fibre discs – four-wheel drive – stepless gear boxes

ENERGY AND RESOURCES

THE TRAINED BODY

29-32

Strength training – increasing endurance – reaction times – stretch receptors – balance and co-ordination – momentum and force – energy reserves – carbohydrate loading

Pack cover: monoskiing; 3D computer breakdown of a gymnast's movements; **Fact file cover:** anatomy of the right knee; climbing the sheer face of Manic Strain

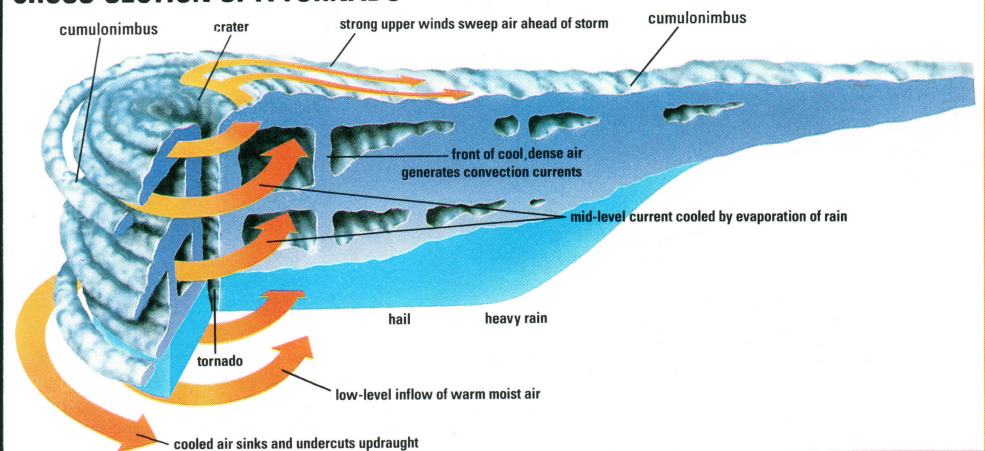
QUEST

ADVENTURES IN THE WORLD OF SCIENCE



- ☐ The troposphere
- ☐ Major wind belts
- ☐ Depressions and anticyclones
- ☐ Cloud types
- ☐ Manipulating weather
- ☐ Weather satellites
- ☐ Synthesizing weather data
- ☐ Photovoltaic cells
- ☐ Violent storms

CROSS-SECTION OF A TORNADO



WEATHER

11

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CONTENTS 11



PLANET EARTH

UNDERSTANDING WEATHER

31-32

Solar radiation – the troposphere – tropical heat – effect of the Earth's rotation – trade winds

NATURE'S FORCES

27-30

Tropical storms – hurricane winds – tornadoes – dust devils – white-outs – electric storms

ELEMENTS IN ACTION

33-36

Weather systems – movement of air masses – depressions – anticyclones – classifying clouds – dew point

THE LIVING WORLD

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39-40

Summertime crime – SAD syndrome – hormone levels – positive effects of negative ions – why sun is fun



NEW TECHNOLOGY

COPING WITH THE COLD

65-66

Snow busters – salting the roads – monitoring systems – insulated clothing – waterproof fabrics – space blankets – hypothermia

FORECASTING

67-70

Data collection – tracking balloons – satellite transmissions – radar networks – automatic buoys – electromagnetic radiation

ENERGY AND RESOURCES

NATURAL POWER

33-34

Wind-powered ships – solar panels – the photovoltaic cell – modern windmills – cruising on jet streams – biofuels

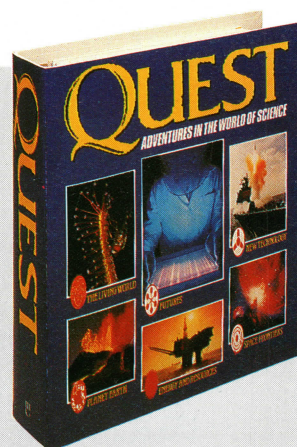
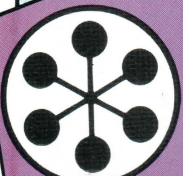


FUTURES

MANIPULATING WEATHER

43-44

Inducing rainfall – consequences of pollution – the 'greenhouse effect' – UV rays – depleted ozone levels



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ADVENTURES IN THE WORLD OF SCIENCE

❑ Autoguide systems for cars



❑ Aerodynamic 'artics'

❑ Monster supertankers

❑ Motorways in the sky

❑ Harnessing animal power

❑ Fuels from animal waste

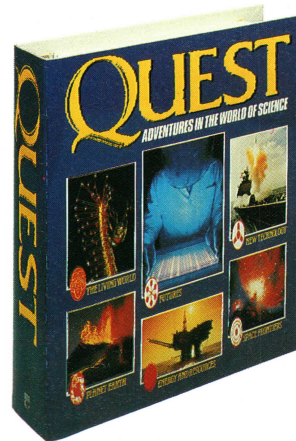
❑ Bicycle styles

❑ The container revolution

TRANSPORT 12.

QUEST

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CARGO CARRIERS

37-40

The container revolution – ultra-large crude carriers – ro-ro ships – pitch propellers – sinking ships

THE LIVING WORLD

BRUTE STRENGTH

41-42

Draught and pack animals – horse power – harnessing oxen – two types of camel – domesticated elephants



NEW TECHNOLOGY

SKY LINERS

71-74

Motorways in the sky – aircraft 'stacks' – instrument landing systems – baggage handling – security – electric scanners – hypersonic aircraft

HIGH-TECH ARTICS

75-76

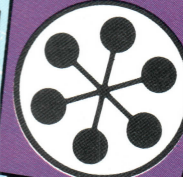
A home from home – self-adjusting disc brakes – lightweight cabs – rubber suspensions – computerized gearboxes – electronic brakes

FUTURES

SPEEDING AHEAD

45-48

Tomorrow's car – autoguide system – fuel injection system – super railways – high-speed trains



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FUELS OF THE FUTURE

35-36

Oil refineries – methane from manure – cheaper, cleaner fuels – unleaded petrol – lean burn engines – dangers of carbon monoxide

PEDAL POWER

37-40

Human horsepower – aerodynamic frames – moulded plastic wheels – derailleur gears – carbon fibre wheel rims

Pack cover: supersonic Sanger plane (MBB-ERNO); time trialling bike (Photosport International), the Channel Tunnel (Channel Tunnel Group Ltd. **Fact file cover:** Ford's prototype car (Ford); visual control room at Heathrow Airport, London

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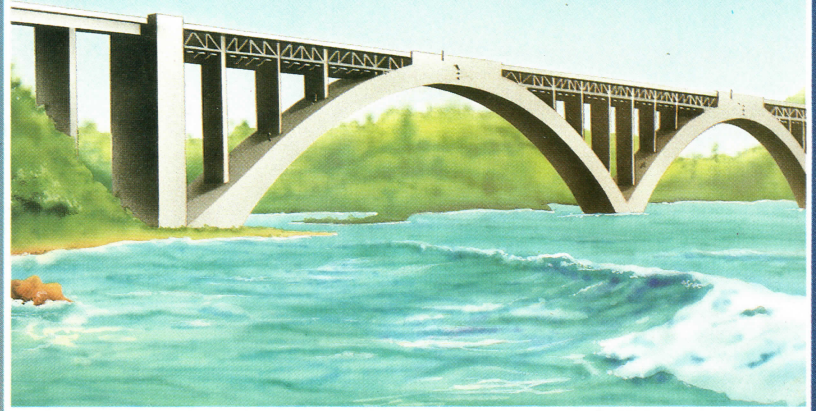
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ADVENTURES IN THE WORLD OF SCIENCE

Steel Arch Bridge



- ❑ Space structures
- ❑ Blasting through rock
- ❑ Artificial islands
- ❑ Pile drivers and mega cranes
- ❑ Are skyscrapers safe?
- ❑ Webs and nests
- ❑ Suspension bridges
- ❑ Cement plants and concrete makers

CONSTRUCTIONS 13

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41-42

Types of dam – water pressure – dam disasters – importance of sluices – harbour walls – barrages and locks – strengthening cliffs

BRIDGES AND TUNNELS

43-46

Single-span and suspension bridges – underwater support – load-bearing arches – blasting tunnels

SEA STRUCTURES

47-48

Offshore platforms – huge floating structures – giant crane barges – buoyancy tanks

THE LIVING WORLD

NATURE'S ARCHITECTS

43-44

Ingenious structures – controlled environments – air conditioning – natural materials – sewing and weaving – chimney spires



NEW TECHNOLOGY

SKYSCRAPERS

77-80

Gravity and wind pressure – support structures – controlling sway – safety factors – fighting fire – automatic sprinkler systems

MEGA MACHINES

81-82

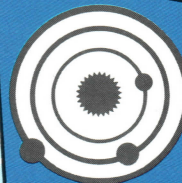
Pile drivers – giant drills – high-power pumps – telescopic cranes – pumping concrete

SPACE FRONTIERS

ASTROSTRUCTURES

19-20

Advantages of weightlessness – modules for space stations – using robots – welding in space

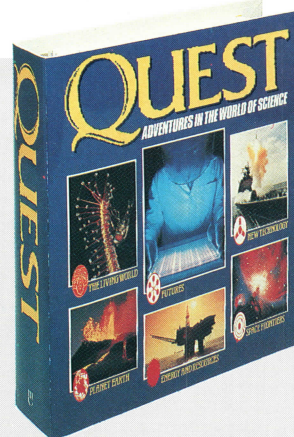
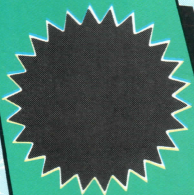


ENERGY AND RESOURCES

TODAY'S MATERIALS

41-44

Versatile cement – shaping structural steel – lightweight building blocks – stress grading timber



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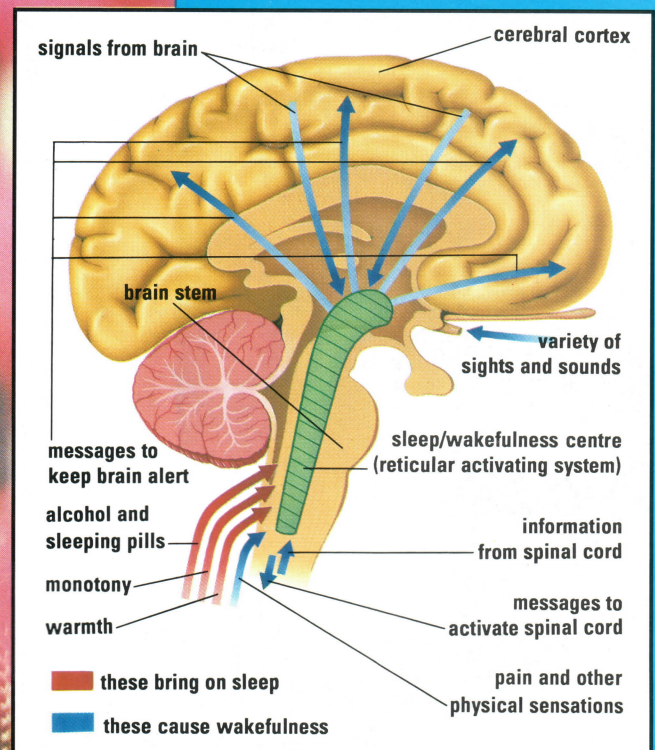
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Pack cover: view of Toronto, Canada, from the world's tallest freestanding structure – CN Tower; artist's impression of the space station 'Freedom', The Thames Barrier, London, England (Alex Bartal/Science Photo Library). **Fact file** covers the 552 metre high CN Tower, steel arch bridges

QUEST

ADVENTURES IN THE WORLD OF SCIENCE

- ☐ Anatomy of a nerve cell
- ☐ Disorders and diseases
- ☐ Investigating the paranormal
- ☐ The vital nervous systems
- ☐ How the mind works
- ☐ Disorientation methods
- ☐ The nature of intelligence



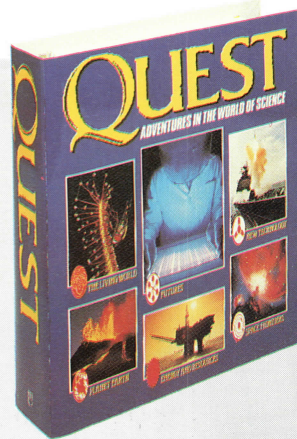
- ☐ Control centres in the brain

BRAIN POWER

14

QUEST

CONTENTS 14



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PLANET EARTH

MIND OVER MATTER

49-50

The paranormal – controlled experiments – hypnotism – acupuncture – spiritual healing – dowsing

THE LIVING WORLD

THE DEVELOPING BRAIN

45-48

Early man – the embryonic brain – brain size – factors affecting development – importance of stimulation – early learning

WHIZZ KIDS

49-50

Different types of intelligence – creative thinking – lateral thinking – mental age – intelligence tests – child prodigies – I.Q.

NEW TECHNOLOGY

IMBALANCES

83-86

Brain chemistry – neurotransmitters – electrical impulses – the body's drugs – blood-brain barrier – diseases and disorders

BRAINWASHING

87-88

Sensory deprivation – white noise – disorientation rooms – hooding – chemical drugs – resistance techniques

FUTURES

ELECTRONIC BRAINS

49-52

The latest computers – memory chips – microprocessors – robots – three-D graphics – modern music synthesizers and sequencers – speech recognition systems

ENERGY AND RESOURCES

MIND AND BODY

45-48

Structure of the brain – two nervous systems – function of nerve cells – transmitting electrical impulses – synapses – the vital spinal cord

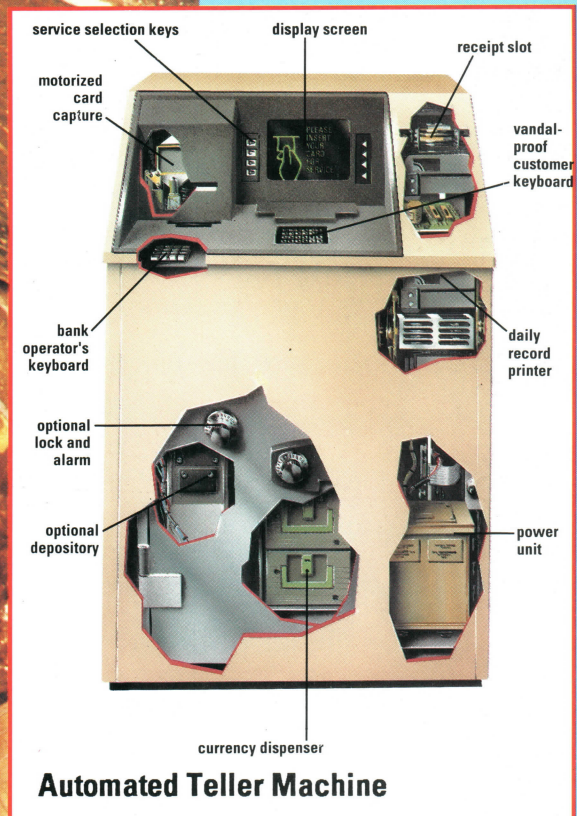
Pack cover: a three-D scan of the skull and brain (main image); piano-playing robot (right).

Fact file cover: a mystic stuck with skewers and hooks; diagram of the BAS (the

QUEST

ADVENTURES IN THE WORLD OF SCIENCE

- Q Making banknotes from jeans
- Q Extracting precious metals



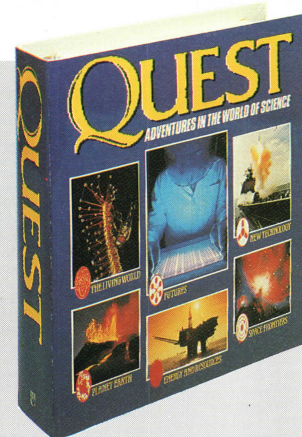
- Q The latest 'smart' card
- Q Oil wealth
- Q Plastic money
- Q Computerized trading systems
- Q Dealing round the clock

MONEY

15

QUEST

CONTENTS 15



PLANET EARTH

THE EARTH'S RICHES

51-54

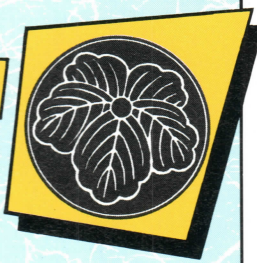
What coins are made of – distribution of precious and base metals – mining – extracting copper by electrolysis

THE LIVING WORLD

TRADING ON THE FUTURE

51-52

'Hard' and 'soft' commodities – modern computerized trading systems – speculation – price monitoring



NEW TECHNOLOGY

HI-TEC SELLING

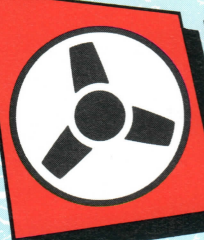
89-92

The International Stock Exchange – electronic dealing systems – up-to-date information services – the 'Big Bang'

SLOT MACHINES

93-94

Hi-tec machines – coin-operated units – detecting fake coins – light sensor scan for notes – ticket machines that give change

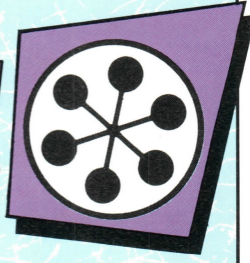


FUTURES

SMART MONEY

53-56

Paying with plastic – microcomputers in cards – automated cash dispensers – the latest 'smart card'



ENERGY AND RESOURCES

MINTING AND PRINTING

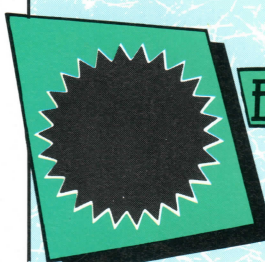
49-52

Foiling forgers – casting and cutting metal alloys – turning 'blanks' into finished coins – making banknote paper – printing processes – security threads

BLACK GOLD

53-54

Petroleum – fuels from oil – paying in petrodollars – oil production – developing new oil fields



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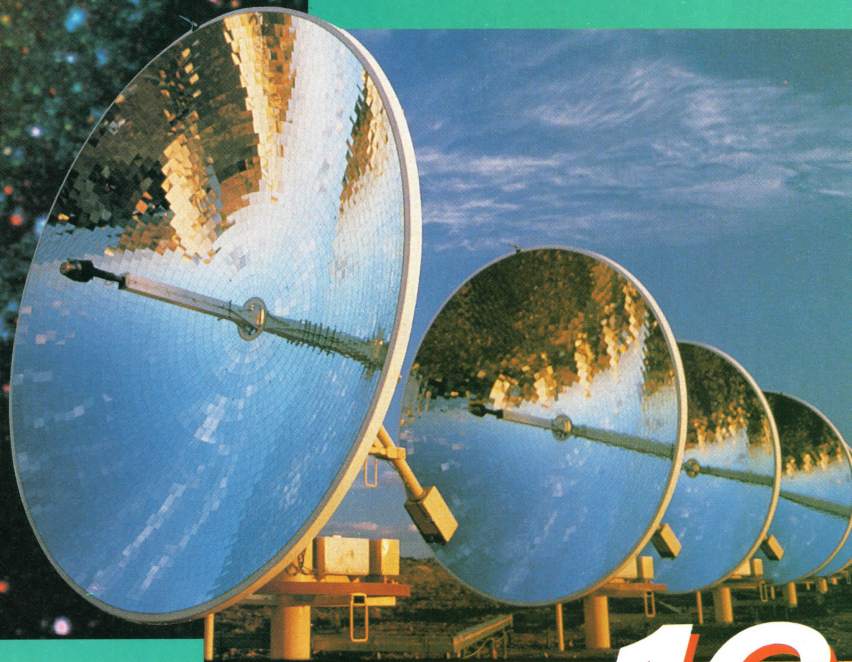
SOUTH AFRICA & MALTA: Back numbers are available through your newsagent.

Pack cover: the bright lights of Las Vegas – gambling capital of the USA (T. Wood/Stock photos); a wheel of assorted credit, charge and debit cards. **Fact file front cover:** International gold coins and bars (ZEFA); diagram of a cash dispenser. Back of pack: The photo of the hologram on the back of the pack is by Philippe Plailly/SPL.

QUEST

ADVENTURES IN THE WORLD OF SCIENCE

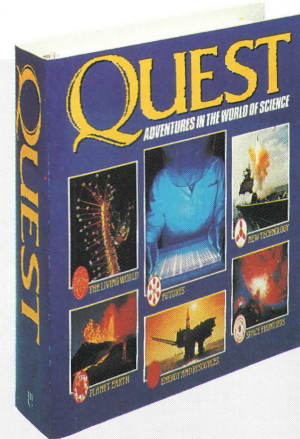
- Q Pictures from Space
- Q High-capacity optical discs
- Q Refraction and defraction
- Q Mirages and false perspectives
- Q Photographic reductions
- Q How animals see
- Q Bouncing light
- Q Laser surgery



LIGHT AND IMAGES 16

QUEST

CONTENTS 16



THE LIVING WORLD



VISION

53-56

Light-sensitive cells – the optic nerve – bipolar cells – many-faceted eyes – multi-focal lenses – 'seeing' heat

OPTICAL ILLUSIONS

57-58

How a mirage occurs – refraction of light – the illusion of movement – visual 'fatigue' – false perspectives – stereoscopes – 3-D films and pictures

NEW TECHNOLOGY

LASERS – HIGH ENERGY LIGHT

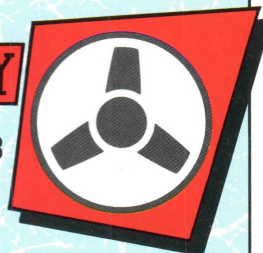
95-98

Electromagnetic radiation – how lasers work – different frequencies and colours – a high-precision surgical tool – vaporizing tumours – killer rays

MOVING PICTURES

99-102

Cine cameras – frame speed and size – projecting the image – revolving shutters – flicker rate – high-resolution films – big screen systems

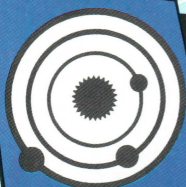


SPACE FRONTIERS

IMAGES FROM SPACE

21-22

New generation Space telescopes – mega mirrors – giant receivers – false colour images – ultraviolet radiation – microwave radiation

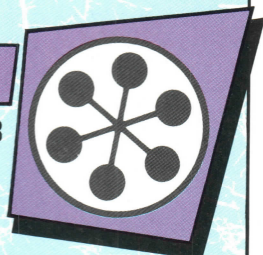


FUTURES

MICRO IMAGES

57-58

Digitized information – imprinting with lasers – cards with memory chips – optical discs for computers – putting libraries on disc – microfilm – photographic reduction

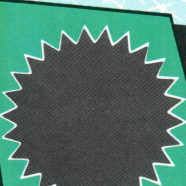


ENERGY AND RESOURCES

UNDERSTANDING LIGHT

55-58

The electromagnetic spectrum – converting light into energy – refraction and defraction – photons – speed of light – splitting light – photosynthesis



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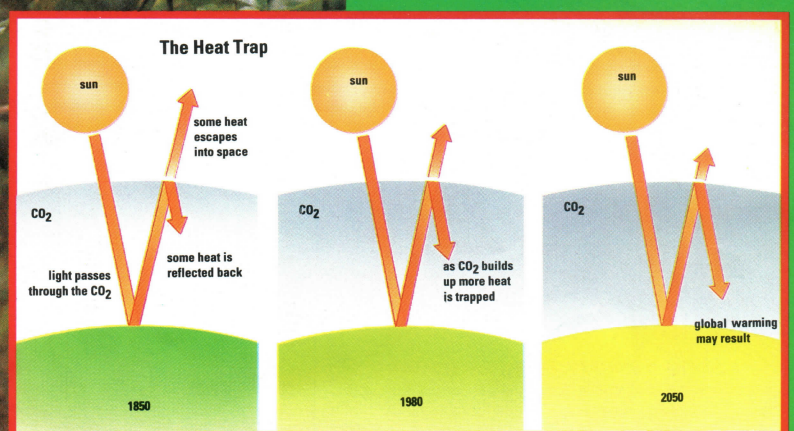
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- Life in the canopy
- How curare works
- Carnivorous plants
- Tribal rites
- Expeditions into the unknown
- The hazards of building dams and highways
- Yellow – the danger sign
- The consequences of deforestation



INTO THE JUNGLE 17

QUEST

CONTENTS 17



PLANET EARTH

INTO THE UNKNOWN

55-58

Expeditions – heat and humidity – dangerous insects – weird meals

THE GREENHOUSE EFFECT

59-60

Photosynthesis – respiration – build up of CO₂ – deforestation

THE LIVING WORLD

THE TROPICAL FOREST

59-60

Layers of vegetation – fighting for light – soil structure – adaptations

PLANT POWER

61-62

Carnivorous plants – flowers that stink – parasites – snares and traps

WILDLIFE

63-64

Danger signs – camouflage – fierce hunters – venomous snakes



NEW TECHNOLOGY

FACTORIES OF THE FOREST

103-106

Logging techniques – tapping latex – building highways and dams – cooling concrete – aerial maps

LIVING LABORATORY

107-108

Plant tonics and painkillers – how curare works – cancer treatments – infusing plants – laboratory analysis – synthetic drugs

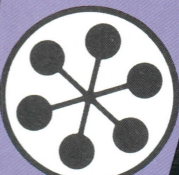


FUTURES

GENE BANK

59-60

Creating new life forms – genetic variations – disease-resistant crops – the vital 'wildtype'

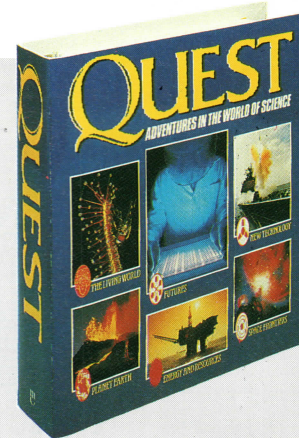
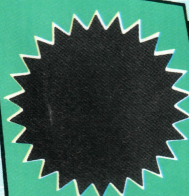


ENERGY AND RESOURCES

FARMING THE JUNGLE

59-60

Turning forest into pasture – slash and burn agriculture – indicator plants – changes in the soil



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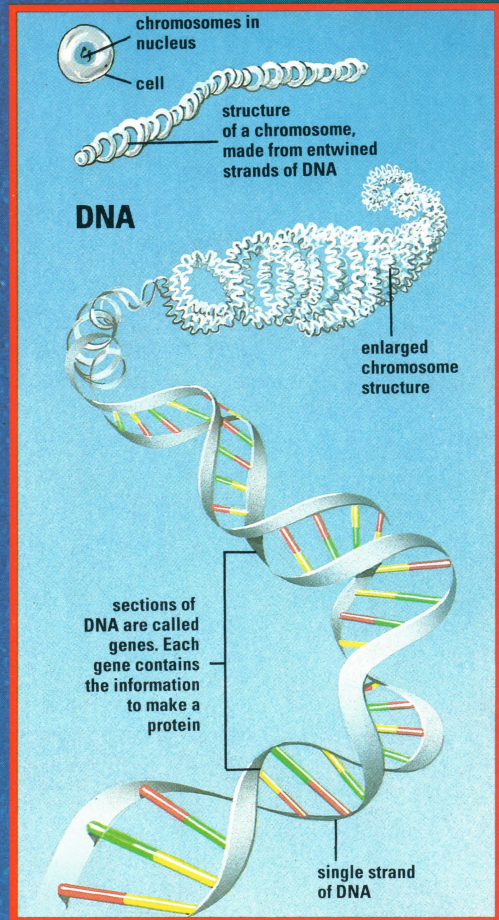
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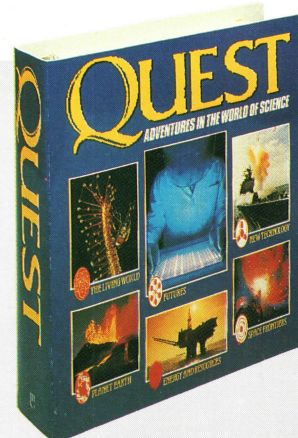
ADVENTURES IN THE WORLD OF SCIENCE



- ☐ What makes you unique
- ☐ Sending out sex signals
- ☐ A new star in space
- ☐ Atoms – the essence of everything on earth
- ☐ Continuation of the species

QUEST

CONTENTS 18



PLANET EARTH

DNA – MOLECULE OF LIFE

61–62

Nature's computer discs – character dictating genes – the genetic code – mutations and diseases

BONDING

63–64

Anatomy of an atom – molecular chains – protons and neutrons – orbiting electrons – hydrogen atoms

THE LIVING WORLD

REPRODUCTION

65–68

Cell divisions – daughter cells – binary fission – bacteria and simple cell organisms – identical offspring

SEXUAL CHEMISTRY

69–72

Sexy scents and signals – courtship behaviour – releasing sex hormones – fertilizing eggs



NEW TECHNOLOGY

BIOTECHNOLOGY

109–110

New plants from cuttings – growing plants in jelly – cloned plantations – creating disease-resistant plants

GENETIC ENGINEERING

111–112

Extracting insulin – transferring genes – modifying bacteria – microinjections – Factor IX – transgenic sheep

SPACE FRONTIERS

STAR BIRTH

23–24

Nuclear transformation – the importance of cosmic dust – stellar shock waves – proto-stars – violent births – killer viruses from outer space

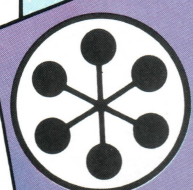


FUTURES

HI-TECH SEX

61–64

Artificial insemination – freezing sperms – fertility drugs – test-tube babies – selective breeding – embryo implantation



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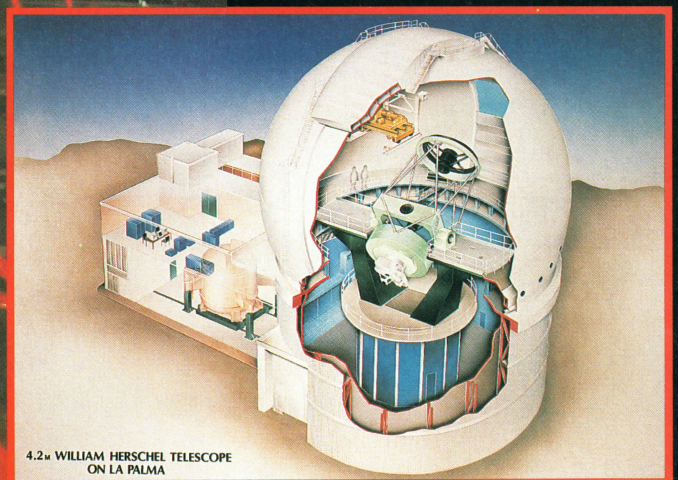
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Pack cover: seedlings growing in test tubes; identical twins (Gamma/Frank Spooner Pictures). **Fact file cover:** false colour photo of Comet Bennett, 1970; a single strand of DNA unravelled.

QUEST

ADVENTURES IN THE WORLD OF SCIENCE

- ☐ Telling the age of planet Earth
- ☐ The meaning of death
- ☐ The birth and death of the Universe
- ☐ Clocks that measure microseconds
- ☐ How animals' tell the time
- ☐ Freezing a moment for ever
- ☐ Time travel – is it possible?



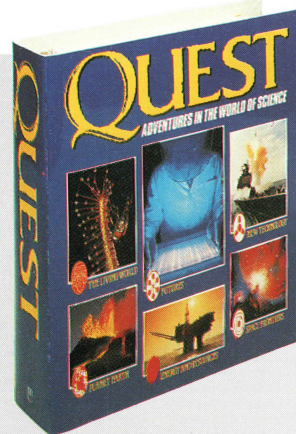
4.2m WILLIAM HERSCHEL TELESCOPE
ON LA PALMA

TIME

19

QUEST

CONTENTS 19



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PLANET EARTH

ROCKS OF AGES

65-68

Rock strata – upheavals in the Earth's crust – irregular layers – fossils – modern methods of dating – clues from pottery

THE LIVING WORLD

BIOLOGICAL CLOCKS

73-76

Internal clocks – lunar cycles – daily rhythms – biorhythms – effects of shift work – jet lag

AGEING

77-80

Life expectancy – comparative lifespans – the oldest living plant – theories of ageing – effects of growing old – death of brain cells



NEW TECHNOLOGY

SPLITTING SECONDS

113-114

The first clock – the Earth's rotation – variable days – measuring time – pendulums – quartz crystals – super-accurate atomic clocks

CAUGHT IN ACTION

115-116

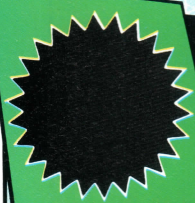
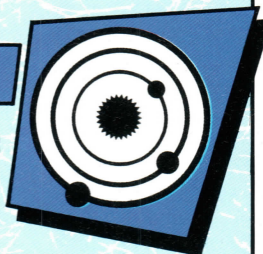
Capturing action on film – shutter speeds – revolving-prism camera – one million frames per second – time-lapse photography

SPACE FRONTIERS

WHEN TIME BEGAN

25-28

Zero time – creation – the Big Bang – atoms form – expansion and contraction of the Universe – birth of the first stars – black holes



FUTURES

TIME TRAVEL

65-66

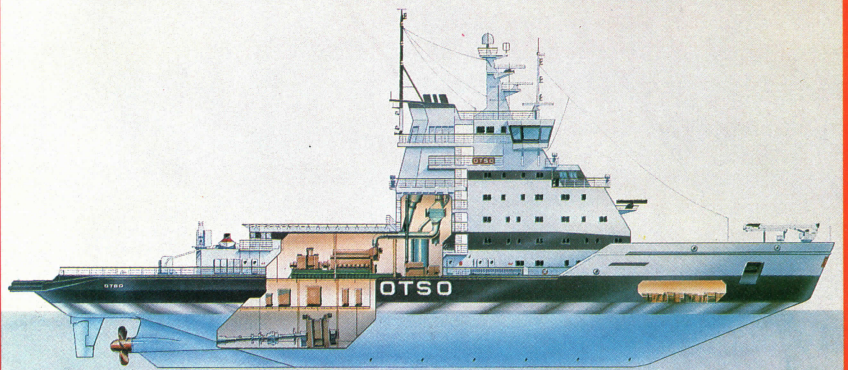
Travelling into the future – the speed of light – when time slows down – time 'dilation' – changes in length and mass

QUEST

ADVENTURES IN THE WORLD OF SCIENCE

- Q The force to move mountains
- Q When dirty water spells danger
- Q Fighting pain with water
- Q How a hydroelectric power plant works
- Q The salt of the Earth
- Q Safeguarding the water we drink

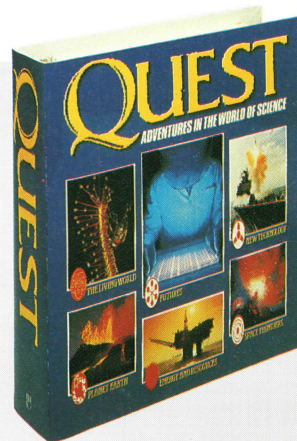
Arctic Icebreaker



WATER OF LIFE 20

QUEST

CONTENTS 20



PLANET EARTH

FANTASTIC FLUID

69-72

Atomic reactors – contraction and expansion – freezing and boiling points – glaciers and icebergs – sound underwater – SONAR

TAKING THE PLUNGE

73-76

Hot and cold packs – the Jacuzzi – why swimming is good for you – 'wet and wild' rides – a surge of adrenalin – bellyflopping with confidence

THE LIVING WORLD



MICROSCOPIC LIFE

81-82

Contaminated water – effects of cholera and typhoid – how bacteria multiply – cause of legionnaire's disease – plankton – ways of sterilizing water



NEW TECHNOLOGY

WATERWORKS

117-118

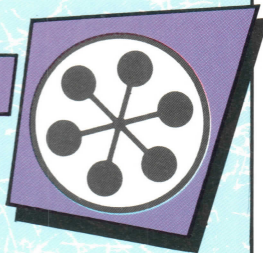
River pollution – legal controls – reservoirs full of fish – chlorine in tap water – solid waste – the sewage works – some uses for sludge

FUTURES

WATER POWER

67-70

Hydroelectric plants – the world's tallest dam – reaction and impulse turbines – the force of the waves – hydrogen-fuelled rockets – quicksand



ENERGY AND RESOURCES

EXPLOITING SALT WATER

61-62

The sea's salt balance – salt lakes and dead seas – flash distillation – salt water crops – salt depletion

THE WATER CYCLE

63-66

Rain, hail and snow – transpiration and evaporation – aquifers – dangers of flooding – too much salt

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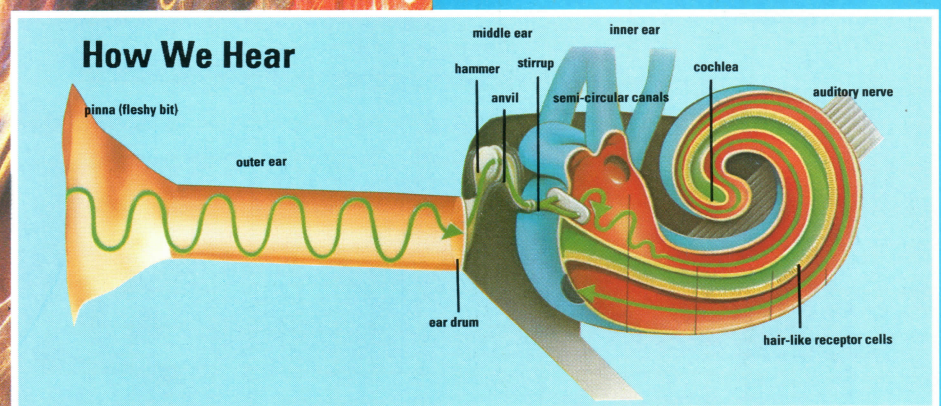
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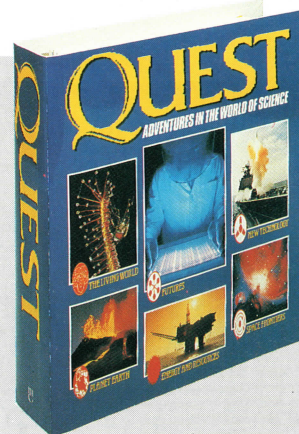
- ❑ Breaking the sound barrier
- ❑ Pure notes
- ❑ Journey of a soundwave
- ❑ What makes up sound?
- ❑ Stretching sound



- ❑ How pop videos are made
- ❑ Our own auditory system

QUEST

CONTENTS 21



PLANET EARTH

MAKING MUSIC

77-80

Recognising music – pure tone – different instruments – sine waves – harmonies – resonance – pitch and timbre – shape and materials

THE LIVING WORLD

TUNING IN – HOW WE HEAR

85-88

Compression waves – analysing sound and music – inside the ear – three zones of the ear – interpreting nerve signals – how insects hear – ultrasonic sound – night 'vision' – reflected sound



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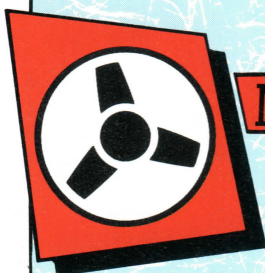
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NEW TECHNOLOGY

MAKING TRACKS

119-122

The recording studio – pilot tracks – synchronising tracks – overdubbing – the mixing desk – adding reverb – digital delays – echoes – chorusing

POP VIDEOS

123-124

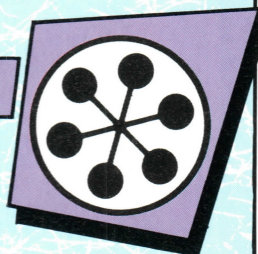
Special effects – combining images on one frame – digital effects – background colour – vision mixing – stretching and shrinking shapes

FUTURES

SYNTHETIC SOUND

71-74

Synthesizers – samplers – sequencers – individual composition – MIDI linking system – layers of sound – volume control

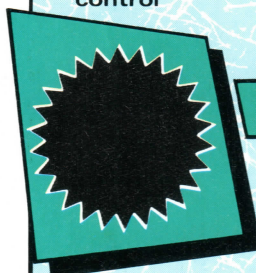


ENERGY AND RESOURCES

SOUND VIBRATIONS

67-68

Sound energy – regular vibrations – sine waves: pure sound – pitch and volume – breaking the sound barrier – ultrasound – shattering glass

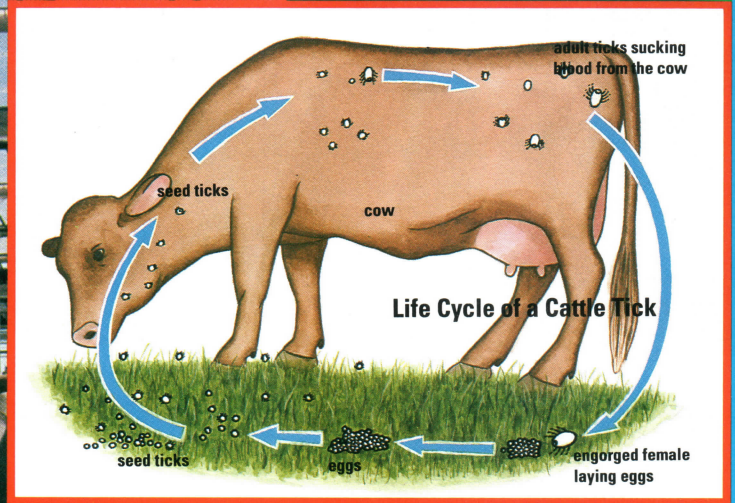


Pack cover: A 24-track mixing desk in a recording studio; Algerian horn blower (Robert Harding Picture Library). **Fact file cover:** time-lapse photograph of light reflecting off a saxophone; our hearing system (inset).

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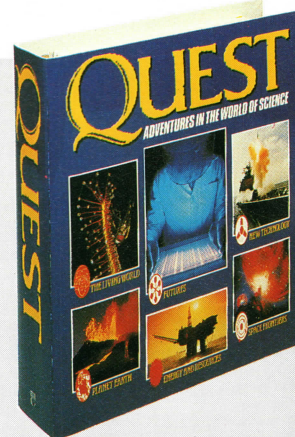
- ❑ The food chain
- ❑ Forcing crop and animal growth
- ❑ Growing plants without soil
- ❑ The real price of pesticides
- ❑ Unusual fish from the seas
- ❑ Prototype Space-farm
- ❑ Irrigating the desert

FARMING

22

QUEST

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PLANET EARTH

FOOD AID

81-82

Shortages and surpluses — unequal distribution — the 'Green Revolution' — growing crops for cash — new solutions to old problems

GREENING THE DESERT

83-84

Irrigation — centre pivot systems — giant revolutions — low pressure methods — harvesting water — fuel and fodder projects

THE LIVING WORLD

PEST CONTROL

89-92

Machines that destroy pests — chemicals that kill them — spraying crops — inoculating animals — side effects of pesticides — polluting the food chain

NEW TECHNOLOGY

FACTORY FARMING

125-128

Computerised feeding systems — mass chicken coops — 'forcing' animal growth — breeding leaner pigs — 'bringing on' crops — earlier harvests

INDOOR FIELDS

129-130

Growing plants without soil — huge hydroponic installations — macronutrients — monitoring nutrient levels — higher yields — artificial sunshine

SPACE FRONTIERS

ASTRO AGRICULTURE

29-30

Prototype Space-farms — the endless days implications of lack of gravity — water from Moon rocks — Biosphere II

FUTURES

FUTURE FARMING

75-76

Automation — test-tube crops — tissue culture — growing cotton in the laboratory — the super soy bean

ENERGY AND RESOURCES

AQUACULTURE

69-72

Farming the seas — overfishing — creatures from the deep — salmon and oyster farms